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Costs, Margins, and Projected Consumption of Turkey Rolls and Roasts

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ABSTRACT

Pre-cooked turkey rolls and ready-to-bake roasts are among the fastest growing product lines in the expanding turkey processing industry. Production of these items was estimated at 250 million pounds in 1972 with a wholesale value of approximately $245 million. Processed poultry products were produced at 383 plants in 1972, with rolls and roasts output from less than one-fourth of these plants. Cost comparisons of simulated model plants indicate that large plants and those operating at full capacity can realize major economies of scale.

Per capita consumption of all turkey meat may reach 11 pounds per person by 1985, up from 9 pounds in 1972, as use of further processed turkey products increases. Turkey rolls, roasts, and breasts could account for 3.5 pounds of total consumption per person in 1985 if present trends persist. Total output of further processed turkey products could reach 1.2 billion pounds annually by 1985 with 70 percent of this volume in the form of rolls, roasts, and breasts.

Key Words: Poultry, turkey, food processing, marketing costs, convenience foods, consumption.

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SUMMARY

Processing turkey into rolls and roasts has been one of the fastest growing segments of the poultry industry in the last decade. Output of these products grew from less than 8 million pounds in the early 1960's to more than 250 million pounds in 1972, and their current wholesale value is estimated at $245 million. These products are produced in all sections of the country even though the heaviest concentration of output is in the Midwest, where the most turkeys are raised.

Over 300 plants further process poultry products, but less than a hundred specialize in turkey rolls, roasts, and related products. Many of these are relatively small operations with underutilized capacity. Substantial savings may be possible by increasing plant size or by utilizing present plants more fully. Cost comparisons from an economies of scale study in the mid-1960's indicate that average processing costs in model plants declined from 91.5 cents per pound in a relatively small plant to 75.3 cents per pound in the largest plant when operating at maximum capacity. Actual economies would vary, of course, depending upon plant location and degree of mechanization, wage rates, number of products, package sizes, and other factors.

Processing costs and marketing margins vary substantially from product to product. Price spreads between the value of turkey meat in the finished product and delivered selling prices ranged from 22 to 32 cents per pound in the mid-1960's. Processing plant costs for ready-to-cook turkey ranged from 54 to 58 cents per pound. Improved efficiencies in processing and marketing could reduce processing costs somewhat in the 1970's, but these efficiencies may be more than offset by higher prices for ready-to-cook turkey and increased labor and materials costs.

Per capita consumption of turkey rolls and roasts in 1972 was estimated to be about 1.2 pounds annually, about 40 percent of the total consumption of further processed turkey products and 13 percent of all turkey meat consumed. The expected rise in demand for convenience food products and higher levels of per capita income in the years ahead could lead to even greater consumption of further processed turkey products. Per capita consumption of turkey meat is expected to increase about 20 percent between 1972 and 1985, virtually all due to further processed products. Consumption of turkey rolls, roasts, and breasts in 1985 may reach a level of 800 million pounds, or 3.5 pounds per person. This level of output would depend, of course, on continued improvements in product quality, greater efficiency in the production and marketing of turkeys in general, and higher levels of demand for convenience food products.

COSTS, MARGINS, AND PROJECTED CONSUMPTION OF TURKEY ROLLS AND ROASTS

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INTRODUCTION

Further processing of turkey products has been one of the fastest growing segments of the domestic poultry industry in recent years. Turkey rolls and roasts are the most important products, and output grew from less than 8 million pounds annually in the early 1960's to 250 million pounds in 1972 (table 1). The wholesale value of these products is currently estimated to be more than $245 million. Consumer-size turkey roasts sold at retail are the leading item processed.

Turkey rolls and roasts are made from deboned turkey meat, normally bre meat, thigh meat, or some combination of the two. There are several types c products ranging from raw, boneless roasts to oven or steam-cooked rolls mad with various combinations of broth or gravy. There are also a variety of pac age sizes and brand names. Turkey roasts normally refer to raw, frozen, deboned turkey meat sold to consumers in package sizes ranging from 1 pound to 4 or 5 pounds, wrapped in foil containers. Turkey roasts have become very popular in recent years, and probably account for close to 85 percent of the overall production of rolls and roasts and nearly one-third of all further processed turkey products (5, p. 18). On the other hand, turkey rolls are mainly an institutional product sold cooked with a binder added. These rolls are made in 9-to-12 pound sizes or larger. Many of these rolls are used by institutions for portion-control feeding or for slicing and resale.

PRODUCTION AND CONSUMPTION TRENDS

In terms of poultry meat input, turkey is the most important class of poultry used for further processing. Nearly 640 million pounds of turkey me were used for further processing in 1972, which accounted for 39 percent of a poultry meat further processed. The share of turkey meat production used fc further processed products grew rapidly from around 8 percent in 1961 to 36 percent in 1972 (table 2). Turkey rolls and roasts accounted for a substant part of this growth.

Table 1--Turkey meat further processed and value of turkey rolls and roasts, United States, 1956-72

Year	Turkey meat used in further processed products 1/	Production of turkey rolls and roasts 2/	Production of other processed products 3/	Value of turkey rolls and roasts 2/
	Million pounds			Million dollars
1956	33	--	33	--
1957	48	--	48	--
1958	62	--	62	--
1959	80	--	80	--
1960	102	--	102	--
1961	105	--	105	--
1962	148	--	148	--
1963	191	8	183	8
1964	211	36	175	34
1965	253	43	210	47
1966	335	65	270	70
1967	318	120	198	108
1968	383	144	239	129
1969	494	168	326	165
1970	479	185	294	180
1971	563	217	346	211
1972	639	250	389	245

1/ Includes only turkeys cut up and used in further processing under Federal inspection, ready-to-cook weight basis. Data from U.S. Dept. Agr., Agricultural Statistics, annual issues, and Poultry and Egg Situation, Feb. 1973.

2/ Estimates obtained from annual issues of "Frozen Foods Almanac" of Quick Frozen Foods, Nov. 1971 and previous years (2). Value figures based on shipments to retailers and institutions. Data not available prior to 1963. Figures for 1971-72 projected.

3/ Residual.

Table 2--Turkey meat used in further processing as proportion of total turkey production, United States, 1961-72

Year	Total turkey meat slaughtered in processing plants 1/	Turkey meat used in further processed products 2/	Proportion of turkey meat further processed	Turkey meat used in rolls, roasts, breasts, and related products 3/	Proportion of further processed turkey meat used in rolls, roasts, and related products
	----Million pounds----		Percent	Million pounds	Percent
1961....	1,256	105	8	22	21
1962....	1,097	148	13	41	28
1963....	1,164	191	16	66	35
1964....	1,253	211	17	84	40
1965....	1,330	253	19	113	45
1966....	1,478	335	23	134	40
1967....	1,665	318	19	143	45
1968....	1,456	383	26	180	47
1969....	1,433	494	34	223	45
1970....	1,567	479	31	266	55
1971....	1,642	563	34	310	55
1972....	1,797	639	36	334	52

1/ Includes turkeys slaughtered under Federal inspection and certified as wholesome on ready-to-cook weight basis. Compiled from U.S. Dept. Agr. sources (7) and (8).

2/ Includes only turkeys cut up and used in further processing under Federal inspection, ready-to-cook weight. Data from (7) and (8).

3/ Estimates based on survey data and unpublished statistics from the Agr. Mktg. Serv.

A survey of the further processing industry in 1963-64 indicated that about 90 million pounds of turkey on a ready-to-cook (eviscerated) weight basis were used in producing turkey rolls, roasts, boned breasts, and related products (11, p. 6). This accounted for 35-40 percent of the total turkey meat slaughtered for further processed products during that period (table 2). With production of these items currently around 334 million pounds, they represent 52 percent of all turkey meat further processed.

Number of Plants

The number of plants producing further processed turkey products has been increasing over time. The 1963-64 survey found 225 such plants. A total of 63 produced turkey rolls, roasts, or breasts, and the others produced a variety

of products, mainly frozen turkey dinners, turkey pot pies, prepared turkey dishes or entrees, bulk boned meat, or cooked parts. In 1969, 295 plants produced further processed turkey products, with 9 plants producing turkey dinne 15 plants producing various types of entrees, 17 plants producing roast whole turkeys, 35 plants producing prepared turkey dishes, and 87 plants producing either roasts or rolls or both (5, p. 8). There were other plants that processed various frozen and canned specialty products also.

In 1970, the number of plants had grown to 301, and by 1972 there were 383 plants producing further processed turkey products (table 3). Increases plant numbers occurred in all regions. The largest number of plants are located in the North Atlantic States, although they process relatively small quantities of turkey meat, compared with plants in the Midwest and South. Th West North Central region does the most further processing, and plants in thi region each averaged over 4 million pounds of turkey products in 1972 (table

Regional Production

Although there are plants in all parts of the country, output of further processed turkey products has been heavily concentrated in the Midwest, where the most turkeys are raised. The West North Central and East North Central regions accounted for more than half of total U.S. output in 1972 (table 4). Relative to population, the West North Central region is the largest surplus producing area. The most important turkey producing States in the Midwest are Minnesota, Missouri, Iowa, Indiana, Ohio, and Wisconsin. Most of these States increased their output at a substantial rate over the last two decades.

Table 3--Plants producing further processed turkey products and average production per plant, by region, United States, 1970-72

Region	Plants			Turkey meat further processed in 1972	Average production per plant in 1972
	1970	1971	1972		
	-----Number-----			Million pounds	1,000 pounds
North Atlantic.....	74	80	86	48.6	565
East North Central..	58	66	67	72.9	1,088
West North Central..	47	59	67	281.6	4,203
South Atlantic.....	32	40	42	89.8	2,138
South Central.....	39	44	48	64.7	1,348
Western States.....	51	65	73	81.5	1,116
United States.....	301	354	383	639.1	1,669

Source: See table 4.

Table 4--Regional production of further processed turkey meat, United States, 1963-72

Year	Regional production as proportion of U.S. output						Total U.S. output
	North Atlantic	East North Central	West North Central	South Atlantic	South Central	Western States	
	Percent						Million pounds
1963	15.2	19.8	30.8	9.7	3.5	21.0	190.7
1964	16.0	11.2	33.1	14.8	6.9	18.0	211.1
1965	16.6	10.2	31.2	14.8	7.7	19.5	252.9
1966	14.4	8.9	28.8	16.6	11.9	19.4	334.7
1967	13.7	13.7	26.6	20.7	9.9	15.4	318.1
1968	11.9	12.6	33.1	21.5	7.8	13.1	382.8
1969	10.2	11.2	39.9	17.2	8.4	13.1	493.8
1970	9.0	13.6	40.9	15.2	9.5	11.8	479.4
1971	7.8	12.2	42.7	15.2	11.9	10.2	562.5
1972	7.6	11.4	44.0	14.1	10.1	12.8	639.1

Source: Regional production data from Agr. Mktg. Serv., U.S. Dept. Agr. Includes only turkey meat processed under Federal inspection, ready-to-cook weight. Regions delineated by Bureau of the Census. North Atlantic includes New England and Middle Atlantic States. East South Central and West South Central were combined. Western region includes Mountain and Pacific States.

Other important turkey-producing regions are located in the South and the West. The South Atlantic region accounted for 14 percent of further processed turkey products in 1972, and the South Central region accounted for 10 percent (table 4). The South Atlantic region is now virtually self-sufficient in turkey production in relation to population. North Carolina is by far the leading turkey-producing State in the region, followed by Virginia, South Carolina, and Georgia, all surplus producing States. In the South Central region, Arkansas and Texas are the largest producers although Oklahoma also grows a substantial number of turkeys. Turkey production in these States has grown only moderately in recent years.

Output of further processed turkey producte in the Western States has increased more slowly than in some of the other regions, and their share of total U.S. output has been declining (table 4). California is the most important turkey producer, but Utah, Colorado, and Oregon also grow a substantial number. These States are surplus producers relative to their turkey consumption needs; other States in the West are becoming more deficit in this regard.

The output of further processed turkey products in the North Atlantic region is also declining in relation to the U.S. total. Pennsylvania leads in turkey production. Turkey production itself is less important in the Northeast than in other sections, and the region has a growing deficit. The production of further processed products in the North Atlantic region and in most of the other deficit sections of the country is based upon substantial inshipments of ready-to-cook turkey or bulk boned meat. In deficit regions, premium prices for fresh turkey in local markets often precludes their use in further processed products except under special circumstances.

Consumption and Demand

Consumption of further processed turkey products has been increasing very rapidly since the early 1960's. Consumption grew from about 0.6 pounds per person in 1961 to an estimated 3.06 pounds per person in 1972 (table 5). Consumption of these products has increased at an annual compounded rate of nearly 17 percent since 1961, when turkey roasts were first sold on a commercial scale. An immediate success, turkey roasts showed a fivefold increase in volume within 4 years after their introduction (5, p. 18; and 13). Consumption of turkey rolls and roasts combined is now estimated close to 1.2 pounds per person (table 5). The market value of turkey roasts alone was estimated at over $150 million in 1971.

Turkey rolls, an older product, were on the market for a number of years prior to the 1960's. Rolls are primarily an institutional product with a much slower growth rate than turkey roasts. The sales of turkey rolls were estimated to be somewhere around $50 million in 1971. Boned bulk turkey meat, breasts, and cooked parts also were available well before the 1960's. However, in the last decade, a greater variety of prepared dishes and specialized products have been made from these items. Production of specialized convenience products has greatly enlarged the market for processed turkey meat.

In 1964, nearly two-thirds of the consumers in a nationwide survey reported that they used some type of further processed poultry product (6, pp. 41-42). These products were purchased most frequently by consumers in the middle and upper income levels and those with higher levels of education or larger families. Families with the head of the household under age 50 also purchased these products more often than older families. Also, consumers in the West reported slightly higher frequency of purchases. Those who buy these products therefore represent a certain level of affluence characteristic of consumers who buy convenience food items in general.

In 1964, the primary further processed turkey products purchased in order of preference were: frozen turkey pies, turkey dinners, boneless turkey rolls or roasts, turkey parts, and vacuum packed sliced turkey (table 6). Most products were widely available in most of the stores referred to in the study. Turkey rolls and roasts were purchased less frequently than frozen turkey pies or dinners, as would be expected, since they were not widely available at that time and were more expensive.

Table 4--Regional production of further processed turkey meat, United States, 1963-72

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Source: Regional production data from Agr. Mktg. Serv., U.S. Dept. Agr. Includes only turkey meat processed under Federal inspection, ready-to-cook weight. Regions delineated by Bureau of the Census. North Atlantic includes New England and Middle Atlantic States. East South Central and West South Central were combined. Western region includes Mountain and Pacific States.

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Table 6--Proportion of consumers purchasing further processed turkey products, United States, 1964

Product	Consumers purchasing products in previous year	Consumers reporting products available in stores
	Percent	
Frozen turkey pies	31	81
Frozen turkey dinners	22	81
Boneless turkey rolls	8	42
Turkey parts	6	42
Vacuum packed sliced turkey	3	32

Source: Compiled from survey results (6), pp. 41-42.

In recent years, demand for turkey rolls and roasts has increased in relation to frozen dinners and pot pies, even though market penetration rates have remained low in relation to unprocessed turkeys. In a 1968 study, only 12 percent of all turkey meat purchases by supermarkets were in the form of parts or further processed products, indicating the low rate of market penetration (table 7). Turkey rolls and roasts accounted for 23 percent of the turkey parts and further processed turkey purchased, with dinners, pot pies, and specialty products accounting for another 18 to 19 percent. Therefore, rolls and roasts constituted 2.8 percent of total turkey meat purchases by supermarkets studied, compared with 2.2 percent for turkey dinners, pot pies, and other frozen specialty products (12, p. 14).

In the institutional segments of the market, turkey rolls have been used more frequently and consequently have a higher market penetration rate. In a national survey of restaurant and institutional outlets made in 1968, 27 percent of the institutions reported using turkey rolls on a regular basis and 23 percent reported occasional use (5, p. 32). Thus, about one-half of these institutions used turkey rolls at one time or another during the year. Use patterns varied greatly among the different types of outlets, however, with hospitals, institutions, hotels and motels, and employee feeding and catering firms using more rolls than restaurants and schools and colleges (5, p. 34).

Another study of turkey product use by colleges, hospitals, and nursing homes in Missouri showed that 43 percent of the institutions surveyed used turkey rolls in 1971 (15, p. 5). However, many of these institutions used whole birds and parts as well as rolls (table 7). Hospitals were relatively heavy users of turkey rolls, colleges used somewhat less, and nursing homes used the least. Only about 20 percent of these institutions reported that they used turkey rolls exclusive of all other types of turkey products. Rolls containing 60 percent white and 40 psrcent dark meat were the most popular. Consumption of turkey breasts was reported by 19 percent of the institutions, with colleges the largest users. Turkey rolls did not receive the same level of acceptance

Table 7--Use of turkey products by retail and institutional outlets, United States and selected States, 1968-71

Type of market outlet and location of study	Type of turkey meat			
	Whole birds	Parts	Further processed	Total
	----------Percent----------			
Distribution of purchases by weight:				
Supermarkets, Texas 1/	88	6	6	100
Restaurants, Texas 1/	79	9	12	100
Restaurants, U.S. 2/	64	12	24	100
Proportion of outlets using certain products:				
Restaurants, U.S. 2/	57	40	23	4/
Nursing homes, Missouri 3/	94	4	24	4/
Colleges, Missouri 3/	80	60	50	4/
Hospitals, Missouri 3/	57	31	71	4/
All institutions, Missouri 3/	80	19	43	4/

1/ Data from (12), pp. 8-16.
2/ Compiled from (14), p. 24 and p. 90.
3/ Data from (15), pp. 5-9.
4/ Not applicable.

as whole roasted birds, due mainly to flavor and appearance. However, their convenience and portion control attributes plus the nutritional advantages of turkey meat for sick or elderly people could still lead to expanded consumption of turkey rolls and roasts in institutional markets.

PROCESSING PLANT COSTS AND EFFICIENCY

Many of the 383 plants producing further processed turkey products are small, specialized operations selling mainly to local markets. However, for certain high-volume products such as turkey pies, frozen dinners, and turkey rolls and roasts, plant operations are larger and more complex.

In 1963-64, 44 percent of all plants producing turkey rolls, roasts, and breasts accounted for nearly 90 percent of the total output of these products (11, p. 9). To a considerable extent, this concentration in the largest plants reflects economies of scale. Economies of scale in processing are largely functions of improved technology, greater labor specialization, and more economical purchasing practices. In marketing, there are substantial economies from

selling products over wider geographical areas, which is facilitated by extensive promotion, advertising, and brand name acceptance.

A study conducted in the early and mid-1960's indicated that substantial economies of scale were possible in production of turkey rolls and roasts (11, pp. 43-48). Cost comparisons were made on the basis of a set of four model plants using a synthetic model-building approach where plants of various sizes were specified based on optimum combinations of techniques and resources. Average costs for processing turkey rolls and roasts dropped from a level of 91.5 cents per pound in the smallest plant producing 243,000 pounds per year to 75.3 cents per pound for a plant capacity of 4.8 million pounds per year (see table 8 and figure 1). It should be noted that 58 percent of the potential savings in costs per pound occurs between model plants I and II (up to 972,000 pounds), and 87 percent of the savings occur between plants I and III (up to 2.43 million pounds).

Table 8--Economies of scale in producing frozen turkey rolls for model plants of various sizes, 1964-65

Model plants	Annual volume		Level of capacity	Output per man-hour	Cost per pound of turkey roll
	Rolls	Parts			
	--1,000 pounds--		Percent	Pounds	Cents
I	97	--	40	--	108.3
	170	--	70	--	96.6
	243	630	100	43.5	91.5
II	389	--	40	--	92.0
	680	--	70	--	85.1
	972	2,522	100	60.1	82.3
III	972	--	40	--	83.4
	1,701	--	70	--	79.5
	2,430	6,305	100	68.5	77.5
IV	1,944	--	40	--	79.5
	3,402	--	70	--	76.5
	4,860	2,610	100	72.9	75.3

Source: Compiled from (11), pp. 36-54. Data not available on parts volume and output per man-hour at 40 and 70 percent of plant capacity.

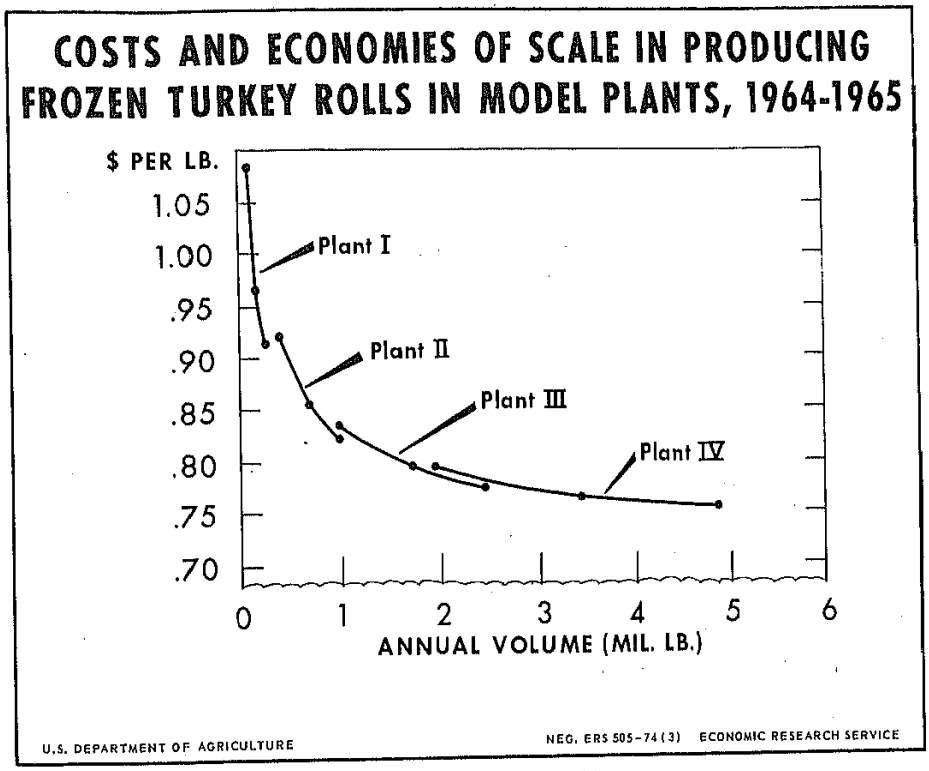

Figure 1

Theee model plants were based on costs and input-output relationships that incorporated the following assumptions:

A. Product Characteristics and Yields

1. Turkey rolls were the main product, with half of the read-to-cook weight input being in the form of breast and thigh meat. Boned-out weight was 60 percent of the ready-to-cook weight.

2. Plants making turkey rolls sold a certain proportion of cut-up parts as a byproduct of the production process.

3. Initial ready-to-cook weights used were: Model I = 3,240 pounds per day; model II = 12,960 pounds per day; model III = 32,400 pounds per day; and model IV = 64,800 pounds per day.

4. In model I, for example, 3,240 pounds of ready-to-cook turkey per day represented 162 birds weighing 20 pounds each. One-half of the weight was assumed to yield breast and thigh meat and the other half turkey parts. Thie means that 972 pounds of boned meat would be available for rolls and 1,550 pounds of cut-up parts would be realized.

5. Each 972 pounds of boned breast and thigh meat was assumed to be made into 108 rolls weighing 9 pounds each. These were packed 4 to a case. Seepage loss was assumed to be offset by the gelatin and broth additives. Parts were packed in 25-pound net weight boxes.

B. General Plant Operating Practices

1. Operating capacity of the plants was defined as follows: 100 percent = 250 operating days per year on an 8-hour day basis, 70 percent = 175 operating days per year, and 40 percent = 100 operating days per year. Single-shift operations were assumed, even though some further reductions in average cost per pound of finished product might be achieved by multiple-shift operations.

2. All poultry was received in frozen ready-to-cook form. The plant had capacity to store 4 days' supply of frozen ready-to-cook poultry and 2 days' output of finished product. Commercial storage would be used for any additional quantities of ready-to-cook poultry or finished product, and this would be reflected in purchase or selling prices and not in plant operating costs.

3. All poultry was hand-boned on the premises where the end product required this form of meat.

4. In-plant labor was available as needed, both in numbers of people and for as many days as required. Wage rates and fringe benefits were the same per hour, regardless of model plant size.

5. Management, superintendents, foremen, office and clerical workers, and quality control and laboratory personnel were hired on an annual basis. Salaries were scaled upward as the size of plant increased.

6. Quantity discounts were obtained when purchasing containers and expendable supplies and services.

7. Prices of production inputs did not change for a plant of given capacity as percentage utilization of capacity changed.

C. Ingredient and Factor Cost Estimates

1. The cost of ready-to-cook turkey was estimated at 30 cents per pound, and the salvage value of cut-up parts was 25 cents per pound. This was deducted from the cost of turkey in carcass form to derive the net cost of meat for boning to make turkey rolls. Costs for non-poultry ingredients were based on a survey of costs for these items in plants in 1964-65.

2. Wage and salary rates were standardized for each plant at $1.50 per hour for plant workers, $3,600-$4,700 annually for clerical workers, and $9,000-$12,500 per year for management personnel. Fringe benefits were 8 percent of annual salaries and wages.

3. Requirements for labor and other inputs were based on techniques and practices prevailing in the most efficient plants contacted in the 1964-65 survey, with provision for quantity discounts where appropriate.

4. Overhead costs were computed as a percentage of original costs for plant and equipment. Depreciation was assumed to be 5 percent per year for buildings, 10 percent for laboratory equipment, and 20 percent for plant equipment. Wear depreciation rates for plant equipment were scaled down for plants operating at less than 100 percent of capacity. Property taxes were 1 percent of the value of land, buildings, and equipment. Interest was assumed to be 3 percent of the original investment value. Insurance was estimated at 1 percent of the value of buildings and equipment. Repairs and maintenance were 3 percent of original value for buildings, office, and laboratory equipment, and 4 percent of the value of plant operating equipment.

An analysis of these model plants shows that a plant the size of model III could produce 2.4 million pounds of turkey rolls annually at a cost of less than $1.9 million. It would take 10 plants of model I size to produce an equivalent volume at a cost of $2.2 million. Thus, there are substantial economies to be derived from larger size plants utilizing the techniques and practices assumed in the study. Since there are a large number of relatively small plants producing turkey rolls and roasts in various sections of the country, the potential savings to the industry could be significant if larger and more efficient operations could be achieved.

Regardless of their size, however, many of the plants producing turkey rolls and roasts operate at less than 100 percent of their potential capacity. Because turkey production is highly seasonal, there may be lees opportunity for these plants to operate at high levels of capacity throughout the year. However, plants producing further processed products can utilize large volumes of frozen turkeys drawn from storage stocks or carried over from the previous fall and winter seasons. Substantial operating efficiencies could be achieved by utilizing plant facilities to a greater degree than is now practiced. The extent of these savings is indicated by the differences in per unit costs at different levels of capacity, shown in table 8. For example, in model I costs per unit of output at 70 percent of capacity are 5 percent higher than at 100 percent of capacity and 18 percent higher at 40 percent of capacity.

Labor costs are an important element in producing turkey rolls and roasts, since a large number of hand operations are involved in processing. Output per man-hour for operating personnel in the model plants ranged from a low of 43.5 pounds per man-hour in model I to 72.9 pounds per man-hour in model IV (table 8). This compared with actual rates of output ranging from 29.4 to 62.5 pounds per man-hour for the plants studied in 1964-65. The average rate of output of

finished product for all plants in the study was 45.6 pounds per man-hour, very close to the low end of the range of output for the model plants. Productivity rates for individual plants in the survey varied with plant size, internal operating efficiency, number of products, package sizes, and degrees of mechanization.

MARKETING COSTS AND MARGINS

Most of the output from further processed turkey producers moves directly from processing plants to institutional markets or retail stores. A large proportion of the turkey rolls, roasts, and boned turkey breasts are sold in this manner. A smaller share of the output of these products is sold through the use of wholesalers or brokers, some of whom do not physically handle the product.

The cost of ready-to-cook turkey meat becomes an increasingly less important factor in the cost structure as the complexity of further processing operations increases and as other ingredients are added in producing the end product. For example, turkey meat costs represent just slightly over 70 percent of the finished product price received by the plant for turkey roasts and boiled rolls, about 63 percent of the finished product price of boned turkey breasts, and 44 percent of the finished product price of oven-cooked turkey rolls (table 9). Other ingredient costs for these products are relatively low, less than 1 percent of the total costs. Freezing costs account for less than a cent per pound on raw frozen items. Cooking costs run somewhat more per pound than freezing costs, but the main difference between the raw and cooked rolls is the weight loss, which could be as high as 30 percent for certain products. In general, however, the weight loss is more than offset by higher selling prices for cooked turkey rolls and roasts.

The price spread between the value of poultry meat contained in the finished product and the delivered selling price ranges from 22 cents per pound for turkey roasts and boiled rolls to 32 cents for boned breasts and 69 cents for oven-cooked rolls (table 9). These spreads are highly variable in individual situations depending on the particular size package and brand name used, the specific product formula, and the type of outlet.

The processing and marketing costs for producing turkey rolls and roasts, based on the study conducted in 1964-65, and with projections for the 1970's, is given in table 10. Raw material costs are the most important, with plant labor costs and container and packaging costs next in importance. Processing plant direct costs, which include turkey meat used, other ingredients, containers, and plant labor, accounted for about 86 percent of the average plant-delivered selling price of raw roasts and boiled rolls in 1964-65. These costs are expected to increase substantially by the mid-1970's. Overhead costs, including management, plant and equipment fixed costs, transportation, and utility costs, were about 10 percent of the total selling price. Some increases in these costs are also projected for the 1970's. Advertising, selling, and miscellaneous costs accounted for the remaining 4 percent.

Table 9--Average selling prices, price spreads, and value of turkey meat in further processed turkey products, United States, 1964-65 1/

Type of product	Average price received by plant for finished product	Value of poultry meat in finished product	Price spread	Value of poultry meat as proportion of final product price received by plant
	----------Dollars per pound----------			Percent
Turkey roasts	0.76	0.54	0.22	71.1
Boiled turkey rolls	.80	.58	.22	72.5
Oven-cooked turkey rolls	1.23	.54	.69	43.9
Boned turkey breasts	.87	.55	.32	63.2

1/ Average selling prices for selected products received by the plant on a delivered basis. Based on price structure prevailing at time of study. Wholesale prices changed very little between the mid-1960's and 1972 except for year-to-year fluctuations.

Source: Based on data from national survey of further processors. See (10), pp. 8-12, and (11), pp. 24-35.

Turkey rolls and roasts are normally sold to customers on the basis of a delivered price. These prices are initially based on markups over processing and delivery costs with due allowance for the competitive price structure in the industry and changes in supply and demand. Retail stores generally price these items on a markup basis similar to other frozen further processed meat products. A summary of the complete cost and margin structure found in the mid-1960's and a projected set of costs and margins for the 1970's is presented in table 11.

The cost and yield factors for the mid-1960's are based on practices prevailing at the time of the original study. Improvements in product quality and more efficient processing techniques are being developed, however, and this should help stabilize plant costs and perhaps increase consumption of these products over time. The hand-boning operations prevalent in the 1960's are being further mechanized in the 1970's. Greater consumer demand could lead to larger and/or more specialized plants and greater utilization of existing capacity. Retail markups declined somewhat in the late 1960's, and they may continue to drop more in the 1970's. However, improved efficiencies in the processing and marketing sectors may be more than offset by higher prices for ready-to-cook turkey or increased labor and materials costs which have occurred in the last few years. Projected retail prices could therefore increase substantially from levels prevailing in the 1960's (table 11).

Table 10--Processing and marketing costs for plants producing turkey rolls and roasts, United States, 1964-65, with projected costs for the 1970's

Cost item	Plant costs 1964-65 1/	Percent of delivered selling price	Projected plant costs, 1970's 2/		
			Low	Medium	High
	Cents per pound	Percent	--Cents per pound--		
Turkey meat costs	58.0	72.5	66.7	83.3	100.0
Other ingredients	.4	.5	.5	.6	.7
Containers and packaging	4.4	5.5	5.0	5.5	6.0
Plant labor costs	6.4	8.0	6.6	7.6	8.6
Management and clerical	2.0	2.5	2.2	2.7	3.1
Fixed overhead costs	3.2	4.0	4.0	4.5	5.0
Advertising and selling	2.8	3.5	3.0	3.4	3.8
Other and miscellaneous 3/	2.8	3.5	3.0	3.4	3.8
Total	80.0	100.0	91.0	111.0	131.0

1/ Based on data from survey of plants producing further processed poultry products. See (10), pp. 8-12, and (11), pp. 24-35.

2/ Projections based on ready-to-cook turkey prices of 40, 50, and 60 cents per pound with 60-percent boning yield. Plant labor costs based on wage rate increases of 50 percent, from $1.50 to $2.25 per hour. Unit labor costs assumed to increase less, between 3 and 34 percent, after allowing for improved productivity in boning operations. Other cost items projected on basis of price indexes of inputs used by food marketing firms.

3/ Includes transportation costs, utility costs, markups, and profits.

Table 11--Processing costs and marketing margins for turkey rolls and roasts, United States, 1964-67, with projected values for the 1970's

Item	1964-67	1970's		
		Low	Medium	High
	----------Cents per pound----------			
Ready-to-cook price to further processing plant 1/	35.00	40.00	50.00	60.00
Turkey meat cost 2/	58.33	66.67	83.33	100.00
Direct boning costs 3/	4.67	4.57	6.67	8.77
Boned meat costs	63.00	71.24	90.00	108.77
Other costs and markups	17.00	19.76	21.00	22.23
Plant-delivered selling price	80.00	91.00	111.00	131.00
Retail store margin 4/	32.00	27.00	33.00	39.00
Retail selling price	112.00	118.00	144.00	170.00

1/ Based on whole carcass value of 30 cents per pound in 1964-67 and 35, 45, and 55 cents per pound in 1970's with 50 percent of carcass breast and thighs used and 50 percent other parts sold at 5 cents per pound lower than carcass value.

2/ Based on boning yield of 60 percent in both the 1964-67 period and the 1970's.

3/ Estimated labor, equipment, and power costs for processing. Further mechanization of boning operations is assumed to reduce impact of higher wage rates in the 1970's.

4/ Retail markups assumed to be somewhat lower by the 1970's. Retail markup as a ratio to retail cost was 140 percent in the 1964-67 period and is assumed to be 130 percent in the 1970's.

Source: Cost data for 1964-67 from (10), pp. 8-12, and (11), pp. 24-35.

PROJECTED CONSUMPTION OF TURKEY PRODUCTS

Per capita consumption of turkey meat has been growing at a compounded rate of 3.4 percent per year since the mid-1950's. The majority of this growth has been due to greater use of further processed products. A larger and more affluent population could lead to even higher levels of consumption of convenience food products in the years ahead. Per capita consumption of turkey meat is expected to increase about 20 percent between 1972 and 1985, with a substantial part of this increase in the form of further processed products. Figure 2 presents past trends and projections of per capita consumption rates for turkey rolls and roasts and further processed turkey products in general. Projected increases in population and per capita consumption of turkey meat are given in table 12. Based on these projections, the aggregate output of turkey meat will be close to 2.6 billion pounds in 1985 with 1.2 billion pounds, or 45 percent of this production, utilized for further processed products. The bulk of further processed products, approximately 843 million pounds, will be turkey rolls, roasts, and breasts. Thus, about 32 percent of all turkey meat consumed in 1985 will be in these forms.

Further processed turkey products already cost more per pound of meat equivalent at the retail level than ready-to-cook turkeys in carcass form. It is also expected that these products will continue to cost more, even though some narrowing of the marketing margin may be possible. Thus, the substitution of rolls and roasts for ready-to-cook turkey on the basis of relative prices will be somewhat limited, or in any event, nowhere near as great as it would be

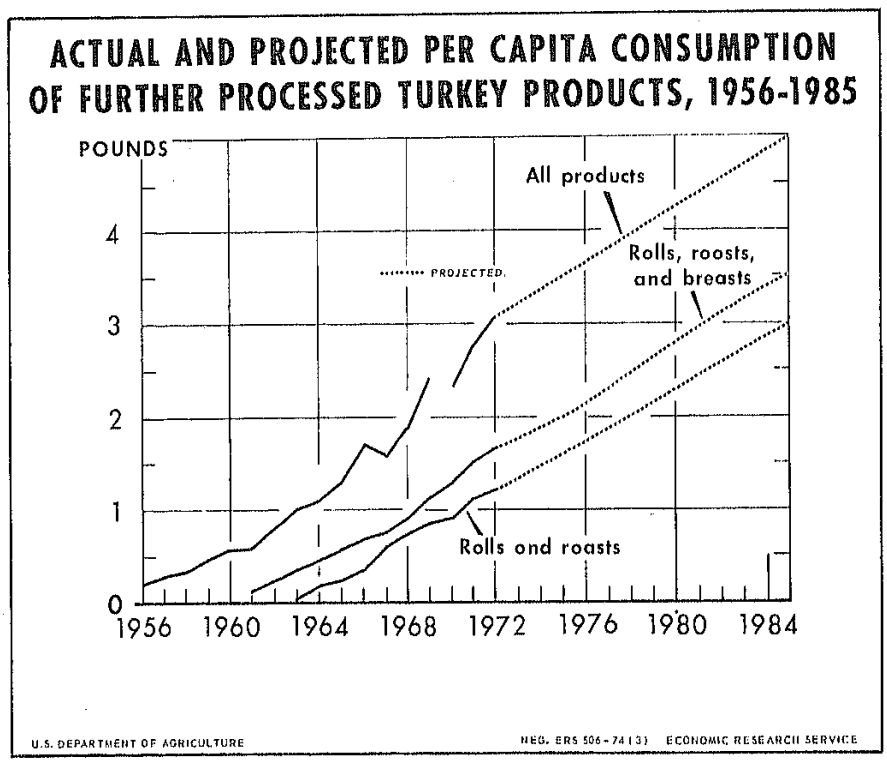

Figure 2

Table 12--Projected consumption of turkeys and further processed turkey products, United States, 1972-85 1/

Year	Population 2/	Consumption of turkey meat		Consumption of further processed turkey products		Consumption of turkey rolls, roasts, and breasts	
		Per capita 3/	Total	Per capita 4/	Total	Per capita 5/	Total
	Mil.	Lbs.	Mil. lbs.	Lbs.	Mil. lbs.	Lbs.	Mil. lbs
1972..	208.8	9.1	1,900	3.06	639	1.6	334
1975..	215.6	9.5	2,048	3.50	755	2.0	431
1980..	227.5	10.5	2,389	4.25	967	2.8	637
1985..	240.9	11.0	2,650	5.00	1,204	3.5	843

1/ All figures based on ready-to-cook weight equivalent. See figure 2 for chart on projected per capita consumption.
2/ Projections from Bur. of the Census, Series D Estimates, (9).
3/ Projections from (3), p. 36, and (1), pp. 10-19.
4/ Projections from (5), pp. 37-41, and (4), p. 24.
5/ Projections based on estimates from (10), p. 14.

if the prices of rolls and roasts were to drop from current levels or otherwise become more favorable. Much of the increase in consumption of turkey rolls and roasts will probably be due to changing preferences of consumers, growth of institutional markets, increases in per capita disposable income, or perhaps a more equal distribution of income in the United States in future years. These factors, plus the demand for more convenience foods, could create a larger potential market for further processed turkey products in the years ahead.

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